# The Catalyst

**The Newsletter for Interpretation in California State Parks**

Summer 2011 Vol. 13, No. 1


## Interpreting Climate Change

60-second exposure using a pinhole Polaroid camera on a Southern California beach.

## Through the Lens of Parks

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# Contributor's Guidelines

*The Catalyst* welcomes your original articles up to two pages in length. We prefer unpublished material, but will occasionally reprint items published elsewhere. Be sure to include information about the publication so we can get permission to use the material. You may submit an article at any time. Please include a photograph whenever possible.

We really appreciate items submitted on CD or by email. We can read most DOS/Windows file formats. Please send photographs as separate files, not inserted into your document. You may also submit original photographs or other illustrations to *The Catalyst*. All photos and artwork submitted will be returned promptly. We reserve the right to edit all material. Items are selected for publication solely at the discretion of the editor and publisher. We appreciate your suggestions.

# Help *The Catalyst* Reduce Waste

We at *The Catalyst* know that you care about both the information we present and the environment. To reduce our carbon footprint, we'd like to deliver future issues of this publication directly to your email inbox. To cancel your paper subscription and have your next issue sent to the email address of your choice, please contact Corinne Nelson at cnelson@parks.ca.gov. To find you in our database, we will need to know your full name and address (or if you receive *The Catalyst* via interoffice email, your unit number). Please provide this information along with the desired email address to ensure that we update your status properly.

# Guest Editors Wanted!

Are you looking for an opportunity to work with other writers on engaging interpretive topics? Would you like to develop and challenge your creative and technical skills? Then consider becoming a Guest Editor for an upcoming issue of *The Catalyst*. Among the topics we're planning for future issues are:

**Interpretation and Technology**
**Interpretive Planning**

Please contact Donna Pozzi with your ideas, dpozz@parks.ca.gov.

# From the Guest Editor

**Kristen Perry**
**State Park Interpreter I**
**Angeles District, Los Angeles Sector**


Interpreting climate change in the Los Angeles Sector parks is a priority. We're developing an exciting new PORTS program at Baldwin Hills Scenic Overlook, setting up weather stations and often partnering in restoration projects that promote conservation. I'm guessing you have also noticed this topic gaining visibility in parks across the state and nation.

The subject can lead you into uncharted and pretty exciting avenues of engaging the public. Because climate change is so poignant and puts so much of what we know at risk, it also has the power to engage a person to connect, understand and act. The heart of interpreting climate change is to consider people's relationship with the environment and their feelings of "home." Climate change puts the "home" of all living things into an unknown future.

The cover photograph is a time-lapse Polaroid of people enjoying the beach. I chose this for the cover because it shows what I feel are the intangible feelings of climate change. These feelings include the suspense of waiting, the urgency of wondering, and perseverance of time.

Emissions from electricity generation and transportation are the biggest contributors to climate change. The public needs information like this to bring a big subject down to something manageable. Who doesn't want to spend less money while reducing pollution and helping combat climate change?

Incorporating this subject into your park's public dialogue would most likely do what we do best, spread awareness and form connections about what makes California State Parks so special, while guiding resource protection goals. As interpreters and state park employees, we have a responsibility to communicate the many voices of each park and how climate change might effect the living and nonliving things we protect. I hope this issue of *The Catalyst* on Interpreting Climate Change answers some of the questions you may have: how is this park being affected, what are parks doing, and what can a single person do about it?

Thanks to all of the authors who contributed articles for this issue and to the staff who helped me. Discussing this subject can help unite us as we face this challenge and make changes in our management plans, operations, and interpretive programs. I hope you find this issue of *The Catalyst* useful and a resource that helps us rethink the many reasons why we work for California State Parks.

# Dear Master Interpreter

**Dear Master Interpreter:**

I work at an historic park, so how can I incorporate climate change into my programs? I don't need to, nor can I.
-Historically Challenged

*You have the opportunity of interpreting climate change through human impacts in the historical period(s) of your park. Nature and culture always intertwine, and poignant programs can be created by revealing the role of the Industrial Revolution ,which would include mining, railroads, factories, urban areas, photography and people's relationship with natural resources. Something might be hiding in your field of vision.*

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**Dear Master Interpreter:**

I don't know where to begin when it comes to telling an audience about climate change. What if they argue with me?
-Scared to Bring It Up

*See how climate change relates to your park and your visitors. We are not in a position to convince anyone climate change is happening; we let them decide. Review "Changing Climate, Changing Parks: An Outline of Key Concepts." It will help you begin to tackle a difficult but important subject. From there, many resources unfold including ones in this issue of* The Catalyst.

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**Dear Master Interpreter:**

The park I work at is part of a network of partners and scientists who study the effects of climate change on natural systems. How can I better engage and inspire the public into making choices that will reduce their carbon footprint?
-Beach Comber

*You could look into a citizen science program for your visitors. Also, weather stations and access to scientific data by park visitors will pique their interest. Updates on your website, social media and other public sites on studies being conducted, wildlife protection stories and drawing the public into care may be good approaches for you to take. Work with your partners. Look at what Ann Marie Tipton and Marnin Robbins have written about in this issue.*

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**Dear Master Interpreter:**

My workspace needs some "cooling." What can I start at my park to make our park truly "Cool"?
-Guilty by Nature

*You can become part of the solution. As a whole, we are trying to reduce greenhouse gases by making facilities more energy efficient and by switching to lower emission vehicles. Make your space a microcosm of coolness—reduce, recycle, reuse. Be an example to your fellow co-workers; educate and inspire. You won't always need to wear sunglasses to be cool, but do if they are phthalate free.*

# What's Up?

## Resources for Interpreters

**Many of these sites also have resources for interpreting climate change to kids!**

**California Climate Change Portal:** http://www.climatechange.ca.gov/

**US Global Change Research Program**- partnership with NPS, U.S. Fish and Wildlife Service, and EPA. http://www.globalchange.gov/

**Climate Friendly Parks**
www.doyourpartparks.org and www.nps.gov/climatefriendlyparks/

**National Park Service Resource Page**
http://www.nps.gov/idp/interp/ICRI%20TEL.htm

**California Natural Resources Agency**
http://www.thankyouocean.org/threats/climate-change/

**Golden Gate NRA Climate Change page**
http://www.nps.gov/goga/naturescience/climatechange.htm

**Climate Change Response Program (join their webinar!)**
http://www.nature.nps.gov/climatechange/

**U.S. Environmental Protection Agency**
www.epa.gov/climatechange

**Visit California State Parks Initiative**
http://ohp.parks.ca.gov/?page_id=24872

**USGS:** http://geochange.er.usgs.gov/

**NASA**
http://www.nasa.gov/mission_pages/noaa-n/climate/index.html

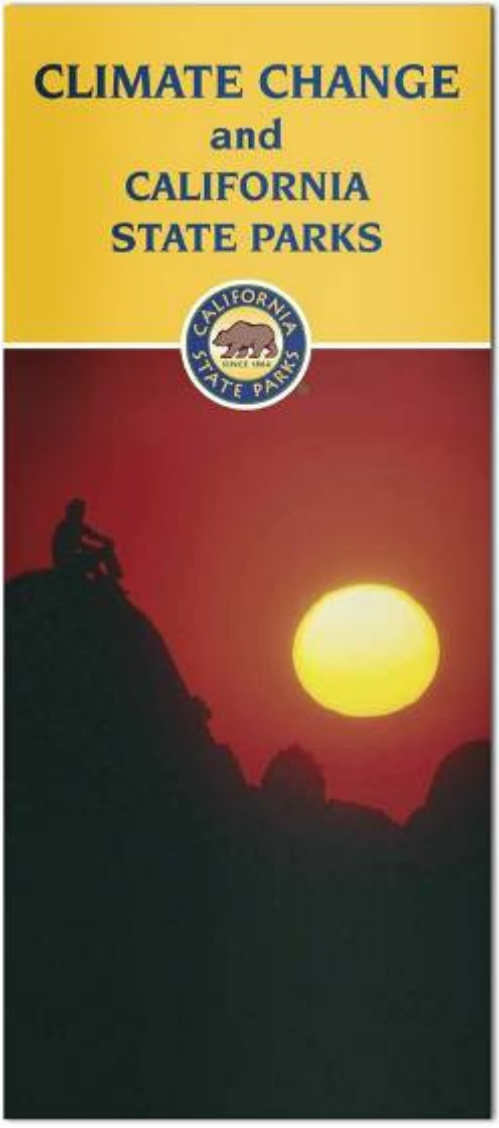
Image of the Day: http://earthobservatory.nasa.gov/IOTD/
Global Ice Viewer: http://climate.nasa.gov/GlobalIceViewer/index.cfm
Earth Observatory: http://earthobservatory.nasa.gov/
Citizen Science: http://earthobservatory.nasa.gov/Experiments/

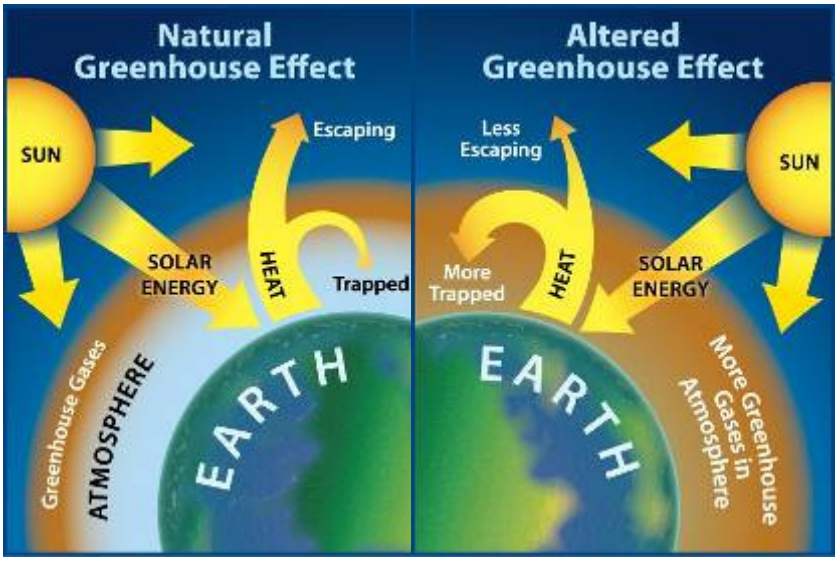
**Climate Literacy Network**
Climate Change Framework and Weekly teleconference www.climateliteracy.net
**Creec Network on Climate Change:** Search the Resource Directory http://www.creec.org/

# New Brochure on Climate Change Available Now

California is a world leader in addressing the issue of climate change. Assembly Bill 32 was passed in 2006 mandating the reduction of greenhouse gases in California. In this brochure, California State Parks focuses on the possible impact on parks. The brochure shares research with the public while giving them the tools to make the choices needed in order to combat contributing factors to human impact on the planet.

The brochure, also available digitally at http://www.parks.ca.gov/pages/24872/files/brochure-climatechange.pdf, explains the challenges and implications climate change can potentially have for California State Parks. It contains easy to understand graphics such as these showing a remodeling of nature's greenhouse.



## What is the difference between global warming and climate change?

The Environmental Protection Agency website www.epa.gov/climatechange explains that global warming and climate change are sometimes used interchangeably.

- "Global warming refers to an average increase in the temperature of the atmosphere near the Earth's surface, which can contribute to changes in global climate patterns. However, rising temperatures are just one aspect of climate change.

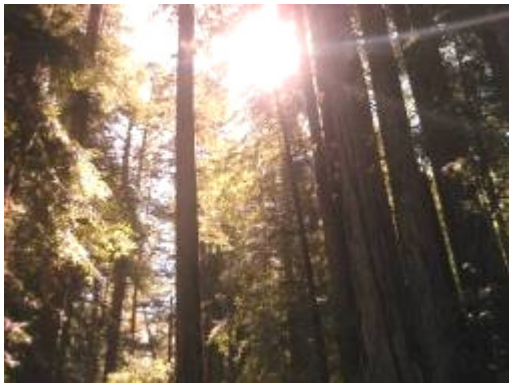
- Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change might result from natural factors and processes or from human activities."

## "Changing Climate, Changing Parks: An Outline of Ten Key Concepts" is available from the Interpretation and Education Division.

- **Change is in the air.**
- **We live in a greenhouse made of gas, not glass.**
- **Human activity is altering the nature of the skies.**
- **The future looks worrisomely warmer.**
- **Earlier episodes of climate change have left an imprint on many of our parks.**
- **Present and future climate change is more likely to harm than to enhance our parks.**
- **Some aspects of climate change will adversely affect park visitors.**
- **California State Parks is preparing for the challenges posed by climate change.**
- **Although climate change is a problem of global dimensions, committed individuals collectively can make a difference.**
- **The climate change issue is complex and, for many, it's confusing.**

# Global Warming and Coastal Redwoods: The Future Is Cloudy

**By Marnin Robbins**
**State Park Interpreter II**
**North Coast Redwoods District**



Redwoods have inspired people for centuries. Will they still be here tomorrow?

One hundred million years ago, ancient redwood forests spanned most of the earth's northern hemisphere. Since the last ice age, however, these "living fossils" have retreated to a few small pockets scattered across the globe. Members of the surviving redwood family (coast redwoods, giant redwoods and dawn redwoods) have held on by withdrawing to environments like those found during the age of dinosaurs. In the case of coast redwoods (*Sequoia sempervirens*), that ancient habitat is the fog-shrouded coast of northern California.

But the north coast isn't as foggy as it used to be, and that has scientists wondering what impacts there might be on redwoods. Coastal fog is generated by the interaction of cool ocean temperatures and warm summer air that hovers just inland from the sea. As the North Pacific has warmed due to global climate change, however, this interaction between ocean and atmosphere has changed, decreasing upper elevation fog.

Presently scientists are studying the long-term effects of reduced fog, warmer temperatures, and higher concentrations of greenhouse gasses on redwood ecosystems—including those within eight state parks. With recent funding from Save the Redwoods League, researchers at several universities have created the Redwoods and Climate Change Initiative (RCCI) that will:

- determine rates of annual wood production for the past 1,000+ years. These measurements will help predict tree and forest growth in response to changing climates.
- reconstruct past climates to learn how redwoods responded to environmental conditions and assess how redwoods are responding to current conditions.
- vary temperature, carbon dioxide and water in greenhouse experiments to examine how redwood seedlings and saplings from different parts of the range might react to climatic changes.

According to Ruskin Hartley, Director of Save the Redwoods League, "No other team of investigators in the world has the unique and complementary skills to conduct this integrated 10-year investigation of redwoods —from leaf to landscape. The (RCCI) program will yield meaningful results in the first year, then data-based solutions to protect redwoods in a changing world."

While scientists implement this long-term research on redwoods and climate change, California State Parks will continue to help our forests adapt to an uncertain future. This includes linking fragmented habitats, protecting redwoods from fire, and restoring forests that have been damaged by logging. Beyond restoration, preserving the remaining ancient redwood groves is important not just for their own survival, but for the survival of plants and animals everywhere. That is because ancient redwoods lock away carbon from the atmosphere, which helps cool the earth's climate. In fact, ancient redwoods are better at sequestering carbon than any other living thing on the planet.

California State Parks has long played a lead role in protecting redwood ecosystems, and is advancing a number of efforts to help parks adapt to potential climate impacts. Interpreters have a vital role in helping spread the message. According to Jay Chamberlin, California State Parks' Chief of Natural Resources, "The Redwoods and Climate Change Initiative will produce information that will help us make decisions about how to protect redwood ecosystems far into the future. Interpreters help get this information to the public and build a constituency for future policy decisions".

Thanks to all of you for getting out the message!

To find out more about the Redwood and Climate Change Initiative, visit: http://rcii.savetheredwoods.org/

# Climate Change and California's Coastal Parks

**By Gary Griggs**
**Ocean Protection Council Science Advisory Team (OPC-SAT)**

Climate changes are already underway within California and are likely to intensify in the decades ahead. Expected changes such as overall higher temperatures, more variable precipitation and runoff, long-term sea level rise, changing coastal storm climate, and ocean acidification pose an increasing risk to our coastal communities and economy.

Interpreting climate change at any of the coastal parks can pose some difficult questions for you as you become aware of some of the related climate science. We are here for you as a resource. Some common concerns and projections we are tackling are included in this article.

Sea level has been rising since the last ice age ended about 18,000 years ago. At that time, sea level was about 350 feet lower than today, and the shoreline was 10 to 20 miles offshore to the west. A state park docent could have led a group of visitors on a hike out to the Farallon Islands, which are 27 miles outside the Golden Gate Bridge! As the climate warmed and sea level rose, ice caps melted, glaciers retreated, the volume of the oceans increased and in response, the shoreline moved gradually landward. At Natural Bridges, Twin Lakes, or New Brighton State Beaches, for example, the shoreline has retreated about 10 miles since the ice age ended. About 5,000 years ago, the rate of sea level rise began to decrease, and with it the rate of shoreline retreat.

Where state park shorelines have been developed with visitor serving facilities, such as restrooms, RV sites, or parking lots (New Brighton or Dockweiler State Beaches, for example), and seawalls or rock revetments have been constructed to protect those improvements, a rising sea level will gradually flood or inundate the beach that the visitors come to enjoy. This will present challenges with the rate of sea level rise being a major driving force behind how soon these losses will occur. For undeveloped coastal parks, whether beach or bluff, the coastline can continue to migrate landward with little initial impact as it has in the past.

The records from offshore monitoring buoys indicate that storm waves along the central and northern California coast are gradually increasing in size. Visitors may not be able to notice these changes yet, but the trends are clear. When combined with high tides, larger waves will have greater impacts on the developed coastline.

The coastline is one of the most dynamic environments on Earth. Waves, wind, tides and other forces of nature are constantly wearing away this ragged edge, and this should not come as a surprise. The shoreline is the battleground between land and sea, a line that is constantly migrating as sea level rises and falls over eons. Within our lifetimes, however, this spectacular edge of ours is only going to move in one direction, inland.

Finally, the State of California is committed to understanding and planning for the changes that lie ahead. One key demonstration of this was the creation of the Ocean Protection Council Science Advisory Team (OPC-SAT), of which I am a member. The OPC-SAT consists of 24 respected scientists from across a range of ocean and coastal disciplines and research institutions. Our mission is to ensure that the best available science supports state policy decisions, and to provide scientific guidance and expertise when called. We are here as a resource for you!

*Dr. Gary Griggs is a distinguished Professor of Earth & Planetary Sciences, and Director of the Institute of Marine Sciences Coastal Processes and Geologic Hazards at UC Santa Cruz. He is also Co-Chair Emeritus of the OPC-SAT.*

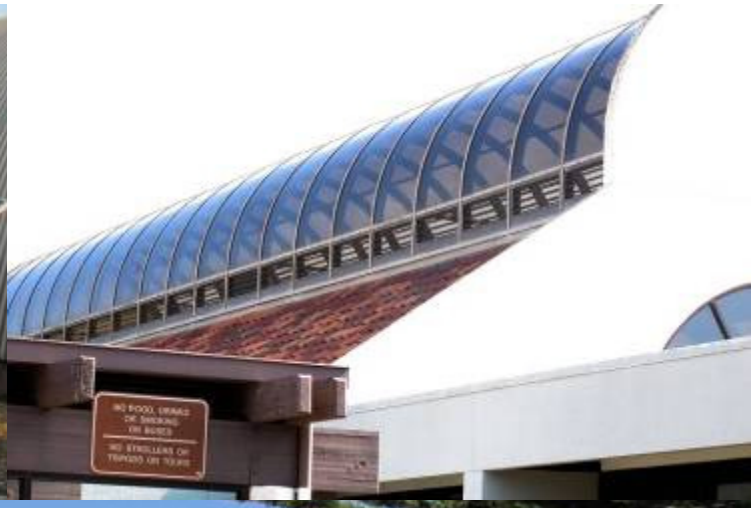
# Conserving at the Castle and on the Coast

**By Constance Gordon**
**State Park Interpreter I**
**San Luis Obispo Coast District**

Scientists now agree that human-caused emissions of carbon dioxide ($CO_2$ ) are a key factor in the current rapid warming trend. By stepping forward to reduce its carbon footprint, the San Luis Obispo Coast District strives to be a community of "cool parks."

## *Reducing Emissions*

"Conservation is the #1 alternative energy source," declares Hearst Castle stationary engineer Lawrence "Sparky" Ross. For that reason, he has managed several lighting retrofits at the Hearst San Simeon State Historic Monument over the years, updating the light fixtures and bulbs to be more efficient. Ross says new lamp technologies are just becoming available which might be acceptable in historic fixtures at the castle to reduce heat and UV damage to the artwork and rare textiles in the collection.



A hydronic system at the monument takes advantage of what was once a chilly Roman Pool. When William Randolph Hearst was in residence, the pool water was heated. Today the state circulates the water through the archives and IT department heat pumps to provide heat in winter and absorb heat during hot summers. By the end of summer, Ross says the 205,000 gallon indoor pool heats to more than 85 degrees Fahrenheit, saving more than 30% in air conditioning energy.

At the Visitor Center, air conditioning is also cut back by using natural air flow. Supervisor John Fixler says louvered vents can be opened at the ceiling on warm days allowing heat to escape and drawing cool air in through the doors. Air conditioning is only used in the building's museum and offices.

Hearst Castle now uses the latest diesel back-up generators for power outages. Ross says the generators are more efficient with less pollution because the computerized fuel regulation significantly reduces the amount of diesel used.

## *Sun Power*

The San Luis Obispo Coast District has installed more than 6,825 watts of photovoltaic panels at Montaña de Oro State Park, and Ross says he is ready to install 8,740 watts at Morro Bay State Park. He is also looking at future solar thermal and solar electric possibilities for the greenhouses on the south side of Hearst Castle, where plants are propagated for the gardens. This would help shrink the castle's carbon footprint by reducing the propane used for heating the greenhouses in the winter.

At remote sites in the district, Ross has installed combinations of solar and quiet wind power for lighting and security. When Limekiln State Park, at the northern end of the district, lost all of its multi-agency radio communication during the 2008 Chalk Fire, Ross was able to modify an existing solar lighting system to power the radio repeaters as well as the existing restroom lights.

# Anza-Borrego Desert, Once a Savannah of Rich Riparian Woodlands

**By LuAnn Thompson**
**State Park Interpreter I, PORTS**
**Colorado Desert District**

Climate dictates life. The Anza-Borrego desert of today is both a living laboratory and an outdoor museum for the study of climate change. Today's desert climate can be experienced through its highly adapted plant and animal residents. Past climates and habitats can be explored through the fossil treasures found in the Borrego Badlands.

Each year, more than 8,000 students travel to Anza-Borrego from their classrooms across California. Their journey begins in the canyons, viewing endangered bighorn sheep and other desert-adapted plants and animals. Spectacular landforms reveal amazing stories of plate tectonics building the surrounding mountains and blocking this area from rainfall. Students fly over far-reaching sedimentary badlands and drop into a slot canyon. Here they discover fossils that visually document the effects of climate change on Southern California habitats and biodiversity.

Anza-Borrego's fossils tell a story describing how today's desert was once a vast savannah laced with rich riparian woodlands. Deposits from ancient streams and rivers trapped and preserved the remains of plants and wildlife that lived here during the past 6 million years. This process represents long and slow cyclical climate change and poses a question to students: If rapid climate change were to take effect, what impacts would that make on the desert?

Via the green-screen studio, students travel back to the Pliocene Epoch, further feeding their imaginations with photographs of Southern California habitats. This is a place and time where ice-age mammoths, giant ground sloths and saber-toothed cats roamed the savannah landscape among herds of camels and horses.

Rising mountains, land bridges, animal migrations, extinctions and layers from massive volcanic eruptions form a strong basis for better understanding climate change.

Fossil records give students an understanding of ancient climate, environment and habitat. Throughout time, life and evolution ultimately depend on climate. Evidence of prehistory is the basis for conclusions that will help us and future generations, as stewards of our environment, to make the best decisions for the future health of the planet.
Find out more at
www.anzaborregopaleo.org

# Your Park May Have Changed the Planet

**By Karma Graham**
**Regional Interpretive Specialist**
**Angeles District**


Intriguing thought, no? As interpreters, we're often focused on finding the outside and inside forces that have influenced our park, but we don't always look at how the historic uses that our park land has been put to may have affected the world around it, in a physical or climatic sense.

To pursue this into the realm of day-to-day interpretation, follow a particular historic use you'd like to interpret for your visitors. For example, at Los Angeles State Historic Park dozens of trains hauling hundreds of cars of freight and people arrived daily. Each of those trains burned tons of coal, or later, hundreds of gallons of diesel fuel. Some searching on the internet (by yourself or a handy volunteer) can find you the particular numbers to plug into that story problem, and voila, you have a tidbit of pertinent historic impact to the surroundings and atmosphere. That tidbit can then be compared to current usage and green design efforts. History and bragging in one!

As we struggle to keep our parks alive in fact and in people's hearts, any opportunity to tie our parks to current events and popular causes is worth considering. It also wouldn't hurt to amaze educators with your skill at blending historic fact into a seamless whole with climate change education, something they are called on to struggle with.

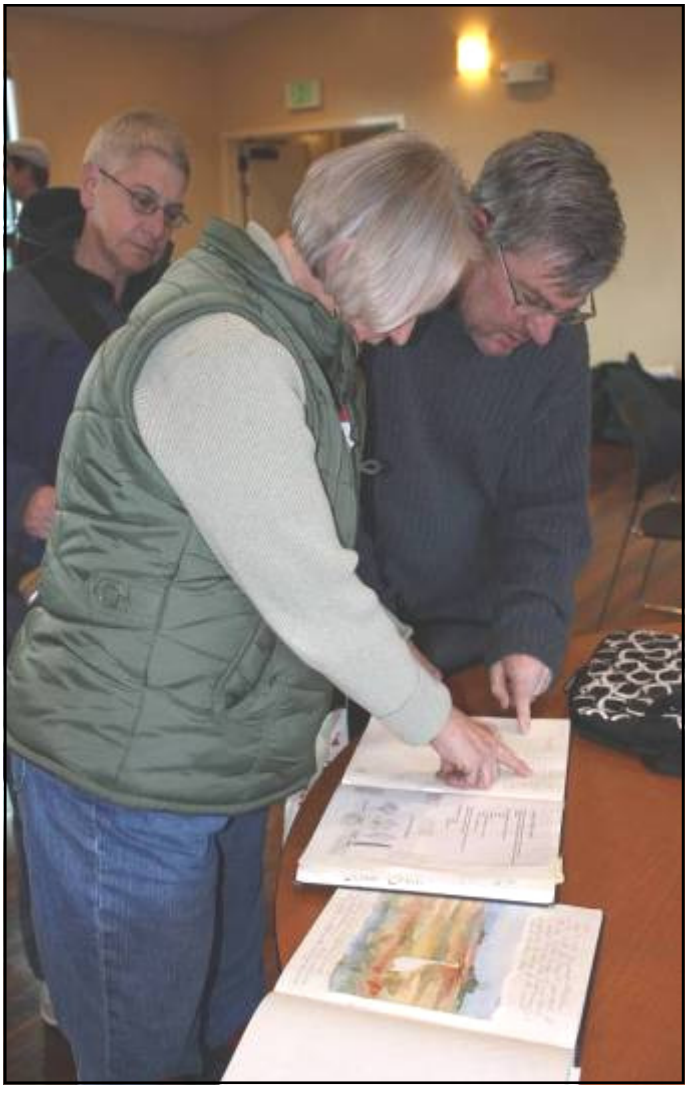
Sometimes, the information you come across is so startling it practically leaps off the page and begs to be told. As long as it blends in with your interpretive themes, subthemes and historic period (check your general plan or planning documents), you can let it off the page and into your interpretation. Talk about the ways your park might change climatic conditions, and you'll make it more relevant to visitors with every cloud, breeze or raindrop they see.

# Climate Change: Notes from the Teacher's Playbook

**By Mary Stokes**
**Regional Interpretive Specialist**
**Retired Annuitant, Interpretation and Education**

***"Sustainable living involves a dual focus; promoting environmental stewardship while also promoting the stewardship of human wellness. Both outcomes are available, in part, from everyday physical and mental engagement with the natural world."***

-Raymond De Young, PhD., Chair,
Behavior, Education and Communications Program
University of Michigan



California teachers are tackling climate change with the same skills and creativity they bring to the entire curriculum. The subject seems daunting in scope and complexity, but there are proven strategies for the classroom that may also help park interpreters navigate this new way to look at the planet. Our State Parks partner, the California Institute for Biodiversity (CIB) presents several approaches in their professional development programs for teachers.

First among these is to consider age-appropriateness—younger children can easily be overwhelmed. They benefit from first discovering the parts and processes of simpler and more tangible systems. Park interpreters already have in their toolbox many engaging techniques for revealing how systems work—think of food webs, an oak tree, or the water cycle. The science content standards can serve as a guide to readiness for adding layers of complexity.

The history and social science standards likewise introduce age-appropriate views of society and how its systems work. Consider

the story of hydraulic mining at Malakoff Diggins SHP, which offers students a lively account of the workings of our economic and legal systems, sprinkled with lessons about the river system, the rock cycle, etc. Our historic parks are filled with compelling examples of the ways that natural and cultural systems are inextricably entwined.

A 6th grader who grasps more familiar natural and cultural systems and understands how deeply these interconnect, has a strong foundation to begin learning about climate change. The new *California Education and the Environment Curriculum* (www.calepa.ca.gov/education/eei/) provides wonderful examples for every grade level.

Another tactic for learning about systems is "I & E." In the school community, this means "Investigation and Experimentation," and standards are set even for kindergarteners. Students build the skill set of a scientist. Younger children learn how to observe, describe, measure, record and communicate their observations. Next, they begin to interpret data, make predictions, construct and test hypotheses, and so on. The parks are wonderful places to practice these in the field and to make connections between the classroom and real world examples.

Today, the internet is fertile ground for "citizen science," with a number of collaborative studies blossoming with student scientists as young as 3rd grade. Visit websites for *Project BudBurst* (www.neoninc.org/budburst/) or *The Journey North* at (www.learner.org/jnorth/) to get an idea of the meaningful data students can collect and report, and how these activities boost learning across the curriculum.

Finally, there is no approach more engaging for kids than to team up on a project that helps solve a real problem. When the skills needed on the project are closely linked to learning objectives in several disciplines, students make amazing strides. They also gain confidence in their ability to solve other problems. Sixth graders have taken on dune restoration at Carpinteria State Beach for example, and 7th graders in Louisiana participate in *Wetlands Watchers*, learning about and restoring wetlands that will provide their state with coastal protection. (See more at www.edutopia.org/project-based-learning). A project of Vermont middle-school students to limit the idling of buses near their school led the way to the Clean School Bus USA campaign (www.epa.gov/cleanschoolbus/).

A teacher at Redwood Middle School in Napa has installed stationary bikes that generate electricity in her classroom. Her students help to offset their class' carbon footprint. In any classroom, students can turn off their lights and workstations before going on a field trip, and calculate the energy saved. They can "do the math" to compare the efficiency of traveling to the park by bus or their parents' cars.

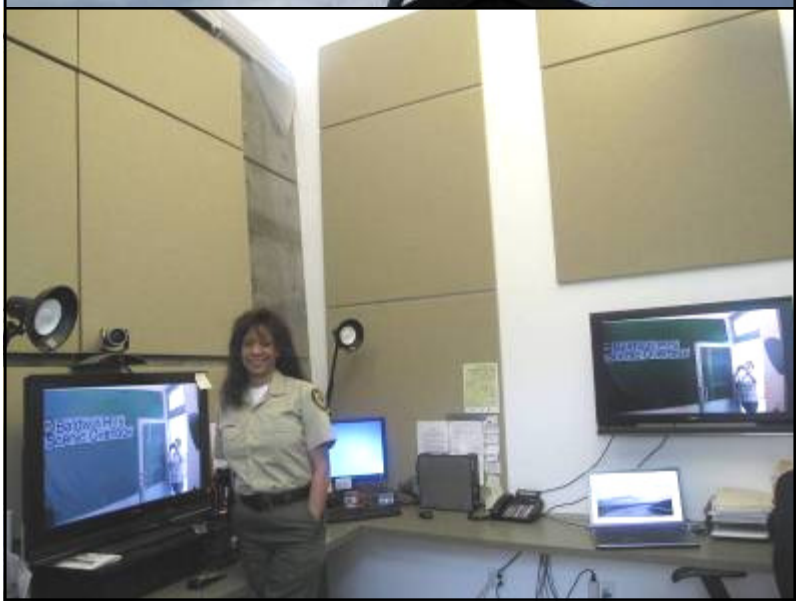
Practical solutions like these traverse that coveted middle ground where most Americans agree. Yale University researchers found broad support for ideas about clean air, renewable energy and conservation, regardless of people's beliefs about climate change.

The following is a National Science Teachers Association recommended book and a great resource for planning your school programs:

**How We Know What We Know About Our Changing Climate: *Scientists and Kids Explore Global Warming***

Lynne Cherry & Gary Braasch
Dawn Publications, Nevada City, California, 2008

**Weather stations like this one installed at Los Angeles State Historic Park will involve students with analyzing data and understanding the difference between weather and climate.**



**State Park Interpreter I, PORTS Dena LeMmons is preparing for a new PORTS program at Baldwin Hills Scenic Overlook that will focus on weather, climate and climate change.**

# Cool Junior Ranger Classroom at Tijuana Estuary

**By Ann Marie Tipton**
**State Park Interpreter II**
**San Diego Coast District, Tijuana Estuary**

In the southwest corner of the United States, we have a lot of identities. We are a National Estuarine Research Reserve (NERR), part of the National Oceanic and Atmospheric Administration (NOAA), a National Wildlife Refuge, and a California State Park. Ten agencies and two cities in Mexico make up our Advisory Council for the Reserve.

It is the best of both worlds to be a part of a state and national system. All of the NERRs are working on a Climate Change Initiative to refocus our efforts on how the Reserves can contribute to climate science and education. The west coast NERRs from Alaska to Southern California are developing a climate change program focusing on the phenological (timing) changes of brant geese, since they can be found all along the Pacific Flyway. NOAA has developed climate literacy standards. You can download them at the website I've listed at the end of this article.

At the Tijuana Estuary we offer Junior Ranger programs 48 times a year. There are twelve topics offered four times a year. Our website is http://trnerr.org/site/?p=472. One of the topics is ***Pollution and Solutions*** which includes the Cool Junior Ranger Classroom lesson that focuses on climate change.

We start the lesson by reading the story about the Keeling Curve from Laurie David and Cambria Gordon's book *The Down-to-Earth Guide to Global Warming* (p.12-20) to help explain the science behind climate change. The interactive part of the lesson is our climate change *Toss Across* activity that we developed and have also used at outreach events. We replaced the Xs and Os from one side of the *Toss Across* triangle with a local animal or plant that will be impacted by climate change. Then we made cards that have a clue that explains the particular impact for each species. For example, the southwestern pond turtle: Clue – Global warming may lead to winter flooding, making my river home very unstable.

We finish the lesson with age-appropriate actions that kids can take to help mitigate climate change. However, James Covell from the Monterey Bay Aquarium warned us to remember that young children don't have the power to change to a more plant-based climate friendly diet or to purchase a fuel efficient car, but they can definitely influence their parents as they get older to make household changes to benefit our climate.

An extension for the lesson is to use the ***Is Climate Change Good for Us?*** page from the Green Teacher *Teaching About Climate Change* book (p.17).

We recently attended a *Reflecting on Practice* training where Emily Yam from the Aquarium of the Pacific had another good piece of advice for communicating with adults and children. According to their marketing consultant, people do not understand the **greenhouse** metaphor; we should use the **$CO_2$ blanket** metaphor instead. The Six America study showed that the obstacle that kept people from making behavior changes was their lack of understanding of the mechanisms of climate change. The Junior Ranger program we offer serves as an example of how to implement a successful interpretive program for kids on a very advanced subject.

I'll be happy to send you our lesson plans if you email me at amtipton@parks.ca.gov.

Resources I use for communication about climate change are:

*Communicating and Learning About Global Climate Change: An Abbreviated Guide for Teaching Climate Change* from Project 2061 at AAAS

Global Warming's Six Americas audience analysis report (how to affect behavior change) http://www.americanprogress.org/issues/2009/05/6americas.html

NOAA's Climate Literacy Standards (http://climate.noaa.gov/index.jsp?pg=/education/edu_index.jsp&edu=literacy)

*Teaching About Climate Change: Cool Schools Tackle Global Warming* (Green Teacher)

# The Price We Will Pay

**By Isaac Pearlman**
**Sea Grant Fellow, Natural Resources Department**

In June of 1988, Dr. James Hansen stood in front of Congress and famously testified that he and his NASA colleagues were 99 percent certain that human emissions were creating a detectable greenhouse effect, which was already changing our climate. This seminal testimony not only represented the beginning of climate change entering society's consciousness, but it also represented a key shift in the evolution of climate science.

Although even today some media portray the science of global warming as "uncertain," the reality is back in 1988 there was already scientific consensus on climate change and its cause. Indeed, as far back as the late 1800's the first global warming theory was proposed (and atmospheric $CO_2$ was only 290 parts per million or ppm). In 1960 when Roger Revelle and Charles Keeling empirically determined the trend in atmospheric carbon dioxide levels (already at 315 ppm), the two were providing hard data to verify what science had already predicted.

Around the time of Hansen's testimony, science shifted from verifying the greenhouse gas effect to empirically proving its cause and projecting future impacts of climate change. Advances in the paleontological record and in atmospheric science have made it undeniable that anthropogenic, or human-caused, emissions are triggering global warming; now more and more scientific effort is focused on climate impacts.

Global climate models have existed for more than 20 years. They are what the Intergovernmental Panel on Climate Change (IPCC) used in its first report in 1990 when it predicted an average increase of 0.3°C each decade through 2100 (an undoubtedly conservative estimate, since already through 2010 we are on pace to exceed that rate). Global models have advanced in complexity to include more climate drivers (see figure X). In the last few years have been "down-scaled" by scientists in order to project what an increase in future global temperature means to climate at the state, regional, and local levels. Even more recently, and more relevant to California State Parks, research is beginning to use these down-scaled climate models to determine how local species and habitat distributions will change in response to future warming.

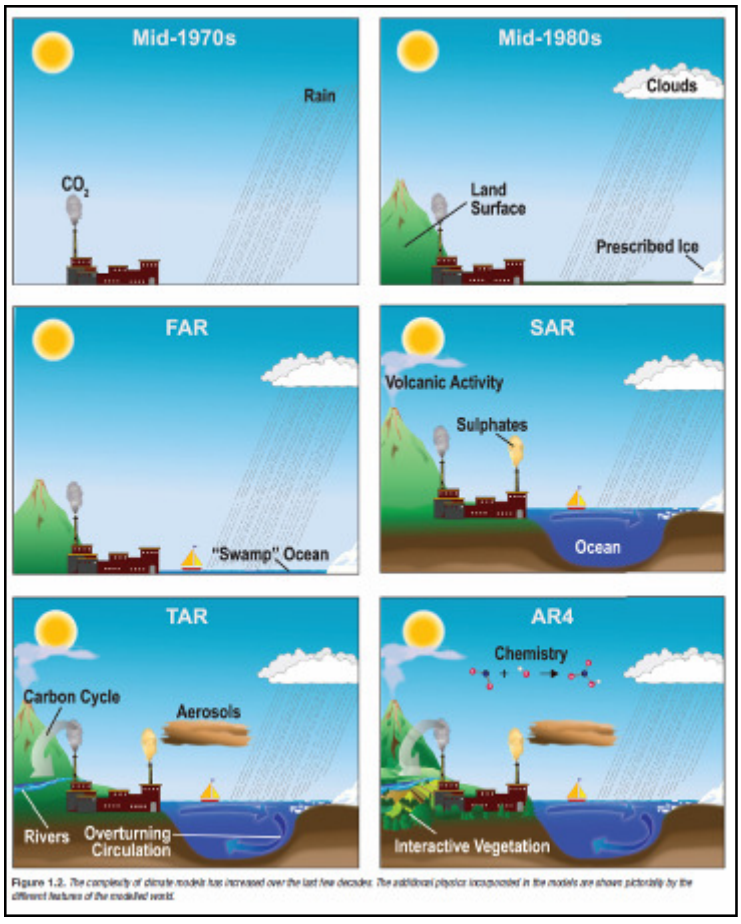


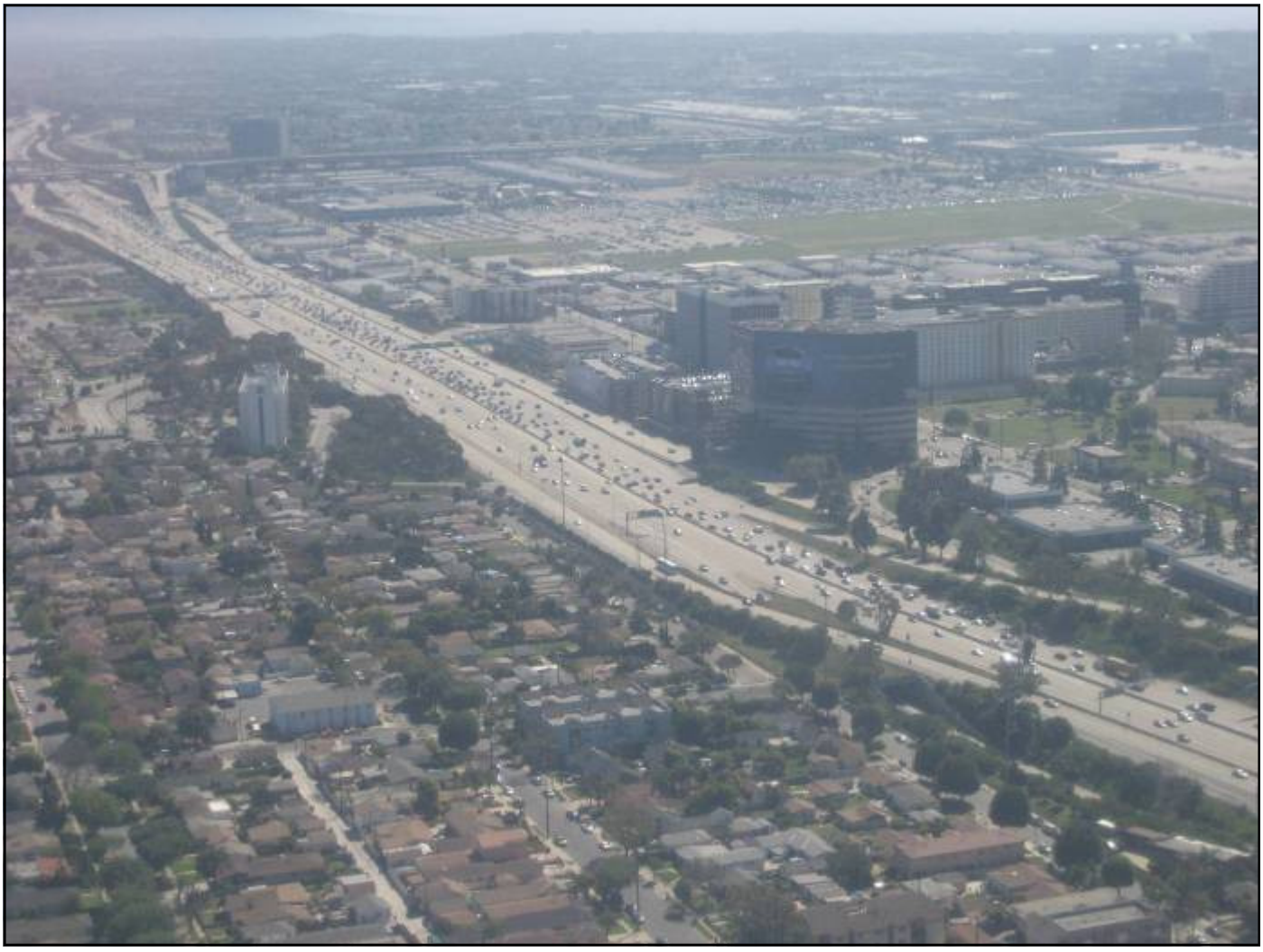

Figure X

Unfortunately, climate science has become intertwined with politics. It has a long history of being misinterpreted on both sides—by "climate deniers" who attempt to use out-of-context bits and pieces of climate science to mislead, as well as those who exaggerate climate science in order to spur response via doomsday prophecies and scenarios.

By their very nature, future climate projections are uncertain since we don't know how much we'll emit in the future. But that doesn't mean climate science is uncertain—over 20 years ago it was certain that global warming was occurring and that human emissions were the cause. Climate science has become exceedingly precise at determining how much global temperatures will increase if we continue to emit as we are today. Climate Science is also improving projections of how that future global temperature will produce local climate and sea level rise impacts to natural resources and human infrastructure.

Science has shown that even if we cease all emissions tomorrow, impacts such as temperature increase and sea level rise will continue due to the long residence time of emissions in the atmosphere (as of February 2011, $CO_2$ is over 390 ppm). Since we are most definitely NOT ceasing all emissions tomorrow nor even decreasing them in the foreseeable future, climate science is now beginning to show a clearer view of the price we will pay—without the need for exaggeration.

*Isaac Pearlman is in the midst of a one-year fellowship researching potential climate change impacts and adaptation management policies for the Natural Resources Division.*



# Contemplating Climate Change

**John Werminski, R.A.**
**Interpretation and Education Division**

Over the past couple of years, my work with California State Parks has given me an opportunity to think quite a bit about climate change. As part of our department's "Cool Parks" initiative, I wrote text for talking points, a panel, and a brochure to help explain this important issue to staff and visitors. As often happens with research/writing projects of this sort, the finished interpretive products convey only a fraction of the information and insights I obtained. What I'd like to do here is to share several thoughts that didn't make it onto the panel or the page—some because of space constraints, and others because they represent not official State Parks views but just my own.

Climate change creates some special concerns for interpreters, for reasons ranging from its complex and controversial nature to the scope and urgency of the problem it presents. If the goals of climate change interpretation are to raise awareness and to promote responsible behavior, then it doesn't help that the public often encounters this issue in the form of counterintuitive facts. How seriously will the average person take pronouncements of a warming planet when new snowfall records dominate the news? If our cars and factories quit emitting $CO_2$ tomorrow, how come atmospheric temperatures would continue to rise for years?

I put these questions to NASA scientists when I attended a workshop for National Park Service interpreters at their Harpers Ferry training center a while back. The NASA scientists not only provided answers, but also offered tips for explaining the underlying science to park visitors. As for the questions raised above, the record snows made sense in terms of changing global air-flow patterns due to warming polar regions. And some short-term warming after $CO_2$ reduction would be a normal "lag effect," just as the peak heat of summer comes weeks after the longest, sunniest day of the year.

To boil all this down: The good news is that climate science is much less contradictory than it may appear. The less-good news is that it will require science-savvy interpreters to convey this kind of good news to a skeptical public.

Despite what critics who deny or downplay the issue might claim, to me the evidence supporting climate change seems unassailable...and the "greenhouse gas" connection between atmospheric

heating and human activity is quite compelling, too. (Check out the graphs on our new brochure if you need convincing on this score.) As for where things are headed, one NASA researcher remarked that the accuracy of long-range statistical predictions will depend less on what scientists don't yet understand than on how humans choose to respond to the problem. To paraphrase, with apologies to Shakespeare: The fault, dear reader, is not in our stats, but in ourselves.

If you combine the worrisome projections about climate change with the size and unprecedented nature of the problem, you have a recipe for discouragement that's hard to counter. As a mere interpreter, I can't redraw the trend lines or scale back dire effects, but I might be able to remove "unprecedented" from the mix with a little story.

There was a period in the mid-nineteenth century when a combination of events produced an equally daunting prospect. Not long before, geologists had discovered that much of the northern hemisphere had quite recently been engulfed by ice. Then physicists, studying the sun's energy output with the best science at their disposal, concluded that a dwindling solar fuel supply would ultimately doom our planet. To their dismay, educated Victorians found themselves inhabiting a world bracketed, past and future, by obliterating ice. As if this wasn't enough, furnaces of the new industrial age were casting a sooty pall over much of Europe, raising fears that nature itself was in decline. It wasn't until much later, when nuclear science was better understood, that the sun—and humanity—gained their present comfortable lease on life.

The conservationist Aldo Leopold once stated that "a sense of history should be the most precious gift of science and of the arts." Whether or not you choose to ascribe a moral to this tale—such as "a little knowledge can be dangerous" or "science and technology will save us" or even "misery loves company"—is up to you. I only know that learning of it made me feel a little better.

An upbeat note in closing: While climate change presents a host of new challenges for park planners and resource managers, it actually offers a new set of opportunities to those of us who interpret what's going on. We're uniquely able to gain the attention of a crisis-weary public by focusing on this now-familiar warming issue through the lens of cherished parks. People are much more likely to care about invisible gases when visible and visitable beaches, snowpacks, and iconic species are shown to be at risk.

And it gets better. California's State Park System enjoys the status of being the finest embodiment of a state that's already a world leader in the search for climate change solutions. That foundation of excellence and authority gives our interpretive messages a special power.

These days we're called upon to speak more soberly than usual about "the best of California" (I'm harking back to an old State Parks tag line here)...but in doing so, let's remind our audiences and ourselves of the "forever" factor, too. Climate change notwithstanding, the state parks remain islands of relative stability in a turbulent, transforming world. For countless Californians, our parks serve as enduring touchstones, helping to anchor and uplift their inner lives. Now, perhaps more than ever, we can draw inspiration from these places—born out of high-minded idealism, built with a "can-do" spirit, and sustained through values that will persist—even come heat and high water.

# California's Tapestry

**A Diversity Feature Article** **Summer 2011**

## The National Association for Interpretation and the Future of the Profession

**By Jim Covel, President, National Association for Interpretation**
**Kevin Damstra, Sierra Pacific Region Director, National Association for Interpretation**

"Change is the only constant," but that doesn't make it easy. As we look around at our professional landscape it may often feel like things are constantly changing. Many things are; but many things are not. The profession of Interpretation is as strong as ever and there are many opportunities for professional growth, as well as to participate in our global profession, from right here in California.

Through trainings, networking, and the support of an interpretive community; the National Association for Interpretation (NAI) is working hard to support interpreters and help lead the profession through these turbulent times. NAI provides networking opportunities with over 5,000 interpreters across North America and 30 other countries. Moreover, NAI works to facilitate interpretive training opportunities in a variety of areas on multiple subjects, including climate change. These opportunities are valuable to docents and entry-level staff looking to develop interpretive skills, and to experienced interpreters that are looking for new perspectives and fresh ideas for services and programs.


During an offsite session at the 2011 NAI International Conference in Panama, Salino and Micaela Garcia of Panama's indigenous Salt Creek community and Fabio Todeschini of South Africa look for howler monkeys along the Chagres River.

Photo by Paul Caputo, NAI

Here are some of the opportunities you may want to explore further:

- Interpretive Workshops: NAI hosts regional, national and international workshops each year. Region 9 fall workshop is in Roseville, CA. The workshop titled "Climate of Change" is scheduled for September 23-25, 2011. The title refers to ways in which interpretation adapts to changing times. For more information please visit our website: http://www.nairegions.org/9/Workshop.html

- This year's national interpreter's workshop is November 8-12 in St. Paul, Minnesota.

- The next international workshop will be in Kailua-Kona, Hawaii, May 8-12, 2012.

- Sections (affinity groups such as Cultural and Living History, Environmental Education, Zoos and Aquariums, Nature Center Directors, etc.) host webinars and publish newsletters that are available to all members.

- Certification and training: Designed for interpreters at all levels with classes scheduled throughout the year in a variety of locations. http://www.interpnet.com/certification/index.shtml

- "Voices in Interpretation" is a set of video interviews with leaders in the field sharing their experience, perspectives and advice. http://www.interpnet.com/voices/

- Standards and Best Practices in Interpretation is a collection of accepted and cutting edge standards of interpretation related to interpretive methods, planning, organizations and curricula design. You are sure to find interesting ideas and perspectives you can apply to your efforts. Visit http://www.interpnet.com/standards/

Most of these resources are available free of charge, and most are downloadable so you can enjoy them at your own pace and your own place. To find out more, check the NAI website at: http://www.interpnet.com/

As we work together to advance our profession, increase our personal skills, and better serve an ever changing group of constituents, it is imperative that we work together and support each other. If one person can change the world, imagine what many, working together, can accomplish.



Photo by Gregory Dunyan

# The Catalyst
# Summer 2011 Contents



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